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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,801	12/02/2003	Wen-Chau Liu	370.7978USU	3318

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EXAMINER	
NGUYEN, JOSEPH H	
ART UNIT	**PAPER NUMBER**
2815	

DATE MAILED: 06/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/725,801	LIU ET AL.	
	Examiner	Art Unit	
	Joseph Nguyen	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,4 and 7-13* is/are rejected.

7)☒ Claim(s) *5 and 6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 7 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Nihei et al. (US 6,822,307 B2).

Regarding claim 1, Nihei et al. discloses on figure 4 a semiconductor diode with hydrogen detection capability, comprising a semiconductor substrate 21(col. 4, line 7); a doped semiconductor active layer 23 (col. 4, lines 10-11) formed on said substrate and made from a compound having the formula XYZ, in which X is a group III element, Y is another group III element different from X, and Z is a group V element; an ohmic contact 25C (col. 4, line 24) formed on said active layer; a Schottky barrier contact layer 25B (col. 4, line 23) formed on said active layer so as to provide a Schottky barrier threbetween, said Schottky barrier contact layer being made from a metal that is capable of dissociating a hydrogen molecule into hydrogen atoms; and an oxide layer 29 (col. 4, line 50) sandwiched between said active layer and said Schottky barrier contact layer.

Note that the Schottky barrier contact layer 25B is formed of Pt (col. 4, line 35) which is the same material being used to form the Schottky barrier contact layer 22 of the instant application (page 6, line 27 of the instant application). Therefore, Schottky barrier contact layer 25B constitutes the similar structure and material as those of claimed Schottky barrier contact layer and is capable of dissociating a hydrogen molecule into hydrogen atoms as claimed.

Regarding claim 3, Nihei et al. discloses on figure 4 the oxide layer 29 has a thickness ranging from 20 to 500A (col. 4, lines 29-30).

Regarding claim 7, Nihei et al. discloses on figure 4 a semiconductor buffer layer 21A (col. 4, lines 7-8) sandwiched between the substrate and the active layer.

Regarding claim 12, Nihei et al. discloses the metal of the Schottky barrier contact layer is Pt (col. 4, line 23).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nihei et al., and further in view of Niwa (US 5,959,317).

Regarding claim 4, Nihei et al. discloses the active layer 23 is an n type InAlAs (col. 4, lines 10-11). Nihei et al. does not disclose the active layer is an n type InGaP.

However, Niwa discloses InAlAs or InGaP can be alternatively used to form an active layer (col. 10, lines 35-40). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nihei et al. by having the active layer being an n type InGaP because they (InAlAs and InGaP) are recognized in the art as equivalents.

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nihei et al., and further in view of Inai et al. (US 2003/0080348 A1).

Regarding claim 8, Nihei et al. discloses the buffer layer 21A is formed of undoped InAlAs with a thickness of about 200 nm (col. 4, lines 8-9). Nihei et al. does not disclose the buffer layer is formed of undoped GaAs. However, Inai et al. discloses GaAs or InAlAs can be alternatively used to form a buffer layer (para [0035], lines 5-7). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nihei et al. by having the buffer layer formed of undoped GaAs because they (GaAs and InAlAs) are recognized in the art as equivalents.

Regarding claim 9, Nihei et al. discloses the substrate 21 is made from InP (col. 4, line 7). Nihei et al. does not disclose the substrate is made from GaAs. However, Inai et al. discloses GaAs or InP can be alternatively used to form a substrate (para [0035], lines 3-4). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nihei et al. by having the

substrate made from GaAs because they (GaAs and InP) are recognized in the art as equivalents.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nihei et al., and further in view of Liu et al. (US 6,724,798 B2).

Regarding claim 10, Nihei et al. discloses the ohmic contact layer 25C is made from Au with a thickness of 200 nm (col. 4, lines 24-25). Nihei et al. does not disclose the ohmic contact layer is made from AuGe/Ni. However, Liu et al. discloses AuGe/Ni or Au can be alternatively used to form an ohmic contact layer (col. 10, lines 21-22). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nihei et al. by having the ohmic contact made from AuGe/Ni because they (AuGe/Ni and Au) are recognized in the art as equivalents.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nihei et al., and further in view of Hase (US 2001/0013604 A1).

Regarding claim 11, Nihei et al. discloses the ohmic contact layer 25C is made from Au with a thickness of 200 nm (col. 4, lines 24-25). Nihei et al. does not disclose the ohmic contact layer is made from AuGe. However, Hase discloses AuGe or Au can be alternatively used to form an ohmic contact layer (para [0060], lines 1-2). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time

the invention was made to modify Nihei et al. by having the ohmic contact made from AuGe because they (AuGe or Au) are recognized in the art as equivalents.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nihei et al.,

Regarding claim 13, Nihei et al. discloses in col. 4, lines 22-23 the Schottky barrier contact layer 25B has a thickness of 10 nm (100 A). Nihei et al. does not disclose the Schottky barrier contact layer having a thickness of 1000 to 20000 A. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nihei et al. by having the Schottky barrier contact layer having a thickness of 1000 to 20000 A, since it has been held that where the general conditions of a claim are disclosed in the prior art discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Allowable Subject Matter

Claims 5-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claims 1, 3-13 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (571) 272-1734. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306 for regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JN
June 7, 2005.

JEROME JACKSON
PRIMARY EXAMINER